Peter McCarthy

Address: Wigan WN6, Lancashire, United Kingdom

Email: peter.mccarthy.0807@googlemail.com

Principal Engineer

I have been the (lead) software developer, systems architect, and Development Manager, for several innovative Loss Prevention & Security systems developed for 4 of the UK's top 5 supermarket retailers. These systems were developed to tight time-scales and budgets, with a very small team of software / hardware developers, and in close collaboration with senior members of retail management (who often reported to the main board).

I have also worked as a self-employed individual on a diverse range of projects, from mobile gaming to on-line shopping.

Furthermore, I founded a small software company that developed a range of Loss Prevention & Security solutions for retailers. In the 3 years prior to being closed-down (in 2018), the company worked in partnership with a global tagging business on a number of innovative projects in areas of Mobile, Wearable and IoT.

Currently, I am employed as a **Principal Engineer** - within a small **R&D team** - at a global education technology company that develops **interactive display and stylus hardware** and **teaching software**. In this role, I research software (and occasionally hardware) technologies for future products, and develop proof-of-concepts for demonstration and hand-over.

As my CV demonstrates, I have a wealth of experience in developing software and architecting systems, have experience in managing a small team of developers, and have run a small company. I am someone who can think differently and solve problems in innovative ways. I am very creative, love to build things, have a flair for design, and possess great attention to detail. I work equally well alone or as part of a team (taking the lead when necessary). I am self-motivated and self-taught, hard-working, trustworthy, and continually want to improve my skills in software and systems development.

Experience

Software Development

Languages

Application

- C / C++
- C#
- Swift
- Java (Android)
- JavaScript ES2021
- Python

Presentation

- HTML5
- CSS3

Query

- T-SQL
- XPath

Frameworks, Libraries & APIs

Frameworks / Libraries

- COM / ActiveX
- .NET (Framework, Core)
- ASP.NET Core (Web API 2, SignalR)
- Core Bluetooth, Nearby Interaction (iOS / iPadOS / watchOS)
- Qt 5
- Express.js
- React.js
- React Native
- jQuery / jQueryUI

Libraries (C / C++)

- FFmpeg (video)
- libyuv (graphics)
- SDL (multimedia)
- LIVE555 (RTSP)
- ZeroMQ (messaging)

- libusb (USB connectivity)

APIs (C / C++)

- POSIX (Linux)
- Win16 / Win32, WinRT (Windows)

AI

Open Source Models

- Llama (language)
- Mistral (language)
- Vicuna (language)
- Stable Diffusion (image generation)
- SAM (image / video segmentation)
- LLaVA (vision)
- Whisper (speech)

Libraries / APIs

- Pytorch
- Transformers (Hugging Face)

Data

Databases

- SQL Server 6.5 - 2005
- PostgreSQL
- MySQL
- SQLite
- Access 7.0 - 2002
- Berkeley DB
- DynamoDB (limited experience)

Formats

- JSON (including JSON Schema)
- XML (including DTD)
- CSV

User Interface

PC

- GDI / WinForms / WPF (Windows)
- UWP (Windows)

Mobile

- Material (Android)
- SwiftUI (iOS / iPadOS / watchOS)
- React Native (Android, iOS)

Web

- HTML5
- CSS3
- JavaScript ES6 - ES2021

Platforms & Runtimes

Platforms

PC

- Linux (Ubuntu 18.04 - 22.04)
- Chrome OS
- Windows 3.1 - 11
- macOS Sonoma

Mobile

- Android Jelly Bean - 10
- iOS 17.5 / iPadOS 17.5

Wearable

- Android Wear 2.0
- Apple Watch 9 (watchOS 10.5)

SBC

- Raspberry Pi (1 - 4; Zero 2 W)

IoT

- Monnit (sensors)
- Disruptive Technologies (sensors)
- Particle Photon

Cloud

- AWS: EC2, Lambda, S3
- Hugging Face Hub

Containerization

- Docker

Runtimes

- Node.js 0.10.x - 20.x
- .NET (Framework 1.0 - 4.8, Core 1.0 - 3.0, 8.0)
- Java (Android, J2ME, SE)
- Swift
- Web Assembly (WASM)

- PWA

Communications

Protocols

- Serial (RS-232 / 422 / 485)
- UDP, TCP/IP (Sockets)
- HTTP
- WS (Web Sockets)
- RTSP

Messaging

- ZeroMQ
- MQTT

Wireless

- Wi-Fi
- Bluetooth (GATT, L2CAP)
- UWB (Apple U2)
- RFID (Texas Instruments TIRIS)
- IR

Wired

- RS-232 / RS-422 / RS-485
- Digital I/O
- USB

Tools

Development

IDE

- Android Studio
- Visual Studio (Professional, Code)
- Xcode
- Swift Playgrounds
- Chrome / Firefox (JavaScript debugging)
- Code::Blocks
- Qt Creator

Compilers

- gcc
- Emscripten

Editors

- Notepad++

Source Control

- Git (GitHub)
- Visual SourceSafe

Command Line

- bash (cp, mv, rm, grep, etc.)
- curl / wget
- ssh / scp
- npm
- git

Productivity

- Google Workspace (Docs, Sheets, Slides)
- Office 365 (Word, Excel, PowerPoint)
- Inkscape
- GIMP

Programming Models

- Asynchronous (promises, async / await)
- Multithreaded (mutexes, semaphores)
- Multiprocess (message queues)
- Concurrency (threads)
- Parallelism (actors)

API Design & Implementation

Shared Library

- SO (Linux)
- DLL (Windows)

Network

- HTTP (REST, SSE)
- TCP/IP (Sockets)

Systems Development Life Cycle (SDLC)

I have many years experience in the following areas:

- **Requirements capture**. Conducting face-to-face meetings with customers, working through their requirements (typically using flip-charts / whiteboards), then formally documenting those requirements

- **Technology research**. Researching the most appropriate combinations of hardware and software technologies for delivering system robustness, performance, ease-of-use and value-for-money

- **Architecture and User Interface design**. Designing system architecture (how hardware and software should connect and work together) and UIs (layouts, icons, etc) for PC, mobile and wearable platforms

- **Timescale and cost estimation**

- **Software development**

- **Piloting**. Installing beta systems in test sites, then working closely with installers and users to fix issues and gather feedback to improve systems

- **Rollout**. Helping to roll-out new systems (into hundreds of sites, in some cases)

- **Documentation**. Authoring technical specifications, installer guides and user guides

- **Support**. Quickly responding to system issues by developing and releasing bug-fixes. At the same time, providing pager / telephone and remote desktop support for installers and users

Management

Development Manager

I managed a small software / hardware development team - while employed at Gratte Brothers Security Management Ltd and Secure Solutions Ltd - developing Loss Prevention & Security systems for retailers. These systems were developed to tight time-scales and budgets, and in close collaboration with senior members of retail management (who often reported to the main board).

In many cases, the retailer only had a very basic idea of what these systems needed to do. As a result, requirements were often provided in handwritten form or captured on flip-charts / whiteboards during meetings. It was my job to translate these requirements into software / hardware specifications for the development team, estimate time-scales, help develop the software, incorporate user feedback, author user and installer guides, and eventually support the systems.

Business

Startup

I founded a small software company (Bibbol Ltd), which has now been closed-down.

Operations

To ensure the smooth and lawful running of Bibbol Ltd, I implemented a simple Health & Safety policy, operated payroll / PAYE, VAT, and bookkeeping systems, ensured prompt payment of bills, raised invoices, and liaised with banks, accountants, Companies House and HM Revenue & Customs.

Employment

I successfully recruited employees, and helped to write contracts of employment.

Career

April 2021-present: Promethean Limited

After leaving Nationwide Produce to pursue new challenges, I joined Promethean Limited
https://www.prometheanworld.com/gb/.

Role

- **Principal Engineer** (2023-present). In this role, I have continued to research software (and occasionally hardware) technologies for future products, and develop proof-of-concepts for demonstration and hand-over.

  A large percentage of the work I have undertaken so far is in the field of **AI**, particularly Large Language Models (text generation) and Diffusion Models (images generation). I am also working with Apple mobile and wearable technologies; investigating how - for example - Ultra-wideband (UWB) can be utilised for spatial computing applications

- **Senior Software Engineer** (2021-2023). In this role, I researched software (and occasionally hardware) technologies for future products, and developed proof-of-concepts for demonstration and hand-over

Technologies

- **Platforms**: Windows, Linux, Chrome OS, Android, iOS / iPadOS / watchOS

- **Tools**: Visual Studio (Professional, Code), Android Studio, Xcode, Swift Playgrounds; Qt Creator

- **Languages**: C / C++, C#, Java (Android), Swift, Python, JavaScript ES2021

- **Open Source**

    - **AI APIs**; Hugging Face Transformers and Diffusers, OpenCV

    - **AI Models**; Vicuna 13B, LLaMA, Llama 2, Mistral 7B, SD 1.4-2.1, SDXL (Turbo), ControlNet, SAM, LLaVA 1.5, Whisper

    - **Libraries**; libusb, FFmpeg (libavcodec), libyuv, SDL2

- **Frameworks**: React.js (JavaScript), Core Bluetooth and Nearby Interaction (Swift); Qt 5

- **Frontend**: Web (HTML5, CSS3, JavaScript ES2021, WASM); Android (Material); SwiftUI

- **Backend**: Node.js, Python

- **Communications**: HTTP (REST, SSE), WS (Web Sockets), USB (Bulk Transfer), Bluetooth (GATT, L2CAP); UWB

- **Cloud**: AWS, Hugging Face Hub, Telegram

2018-2021: Nationwide Produce PLC

After closing-down Bibbol Ltd, I joined Nationwide Produce PLC https://www.nationwideproduce.com.

Role

- (Full-stack) Software Developer

Project Highlights

- I designed and developed a number of **mobile-driven solutions** to support the operation of the

business in key areas such as product sales, quality control, warehouse picking and stock control

- At the **frontend**, the systems are written in Java (Android), React Native (Android, iOS), React.js, vanilla HTML / CSS / JavaScript, and C# (WinForms)

- At the **backend**, the service-oriented systems are written in C#, using ASP.NET Core - utilising Web API 2 (for REST) and SignalR (for real-time). SQL Server and T-SQL (sprocs, views, functions) are used to store and query data

- As well as designing and developing, I provided out-of-hours support for the systems if required. I also authored technical specifications and user guides

2008-2018: Bibbol Ltd

After self-employment, I decided to return to the field of retail Loss Prevention & Security, and I founded Bibbol Ltd.

Roles

- Founder / Director
- Software Developer

Project Highlights

- **Watchman**. A wearable solution for receiving instant (text and photo) notifications triggered by alarms and suspicious activity

  - Comprised server software written in JavaScript (with a HTML / CSS configuration Web UI), running on Node.js, installed on a Raspberry Pi 3 Model B device. SQLite was used to store notification data

  - Comprised client software written in Java, running on multiple Android Wear 2.0 smartwatch devices

  - Client-server communication was performed via ZeroMQ and HTTP (REST), and data was exchanged using JSON

  - I conceived, designed and developed the solution. I also demonstrated the solution to Sainsbury's, and later forged a partnership with a global tagging business to supply the solution with their own Electronic Article Surveillance (EAS) solutions. Subsequently, the partner demonstrated the solution to a number of UK, European and US retailers

- **Podium**. A mobile solution for controlling a retailer's CCTV system

  - Comprised server software written in C (with a HTML / CSS configuration Web UI), installed on a Raspberry Pi 2 / 3 Model B device

  - Comprised client software written in Java and C / C++, running on an Android Jelly Bean / Kit Kat tablet device. To receive, store and render live video, heavy use was made of the FFmpeg and LIVE555 libraries (via Android NDK)

  - Client-server communication was performed via ZeroMQ and HTTP (REST), and data was exchanged using XML and JSON

  - I conceived, designed and developed the solution. I also demonstrated the solution to Asda, Sainsbury's and Matalan, with interest shown from Next, TK Maxx and One Stop. Furthermore, I forged a partnership with a global tagging business to supply the solution with their own Electronic Article Surveillance (EAS) solutions

- **Bespoke**. I was also been involved with designing and developing a small number of bespoke solutions for other businesses, including:

- **IoT in Retail**. A proof-of-concept for integrating Disruptive Technologies' sensor cloud solution https://www.disruptive-technologies.com with the cloud solution of a global tagging business. It comprised server software written in JavaScript, running on Node.js, installed on a Linux VM in Microsoft Azure cloud. It also comprised client software written using Ionic and Angular, running on multiple mobile (Android and iOS) devices. A combination of HTTP (REST) and Socket.io was used for client-server communications. (Cloud) servers communicated using HTTP (REST, SSE)

2002-2008: ingeniosys

I left Gratte Brothers Security Management Ltd to pursue new career challenges, and worked as a self-employed individual (ingeniosys) while helping to raise a young family.

Roles

- Owner
- Software Developer

Project Highlights

- **On-line Shopping**. I designed and developed, from scratch, a complete online shopping system for the sale of fresh meat and delicatessen produce. This was written in C# and ASP.NET and made use of Microsoft Web Service Enhancements (WSE) 3.0 for secure SOAP communications

- **Websites**. I designed and developed a small number of websites, during which I improved my skills in HTML, CSS, JavaScript, and PHP (with Server Side Includes)

- **Mobile Gaming**. Some 5 years before the iPhone and the App Store, I developed a small number of games for Nokia and Sony mobile phones. These were written in Java (running on J2ME) and were uploaded to a number of app stores for OTA distribution

2000-2002: Gratte Brothers Security Management Ltd

I joined Gratte Brothers Security Management Ltd after its acquisition of Secure Solutions Ltd's development team and systems technology.

Roles

- Development Manager

Project Highlights

- **Sentinel**. On acquisition, the TIGRIS system was renamed to Sentinel and then customised for use in Tesco stores only. I helped to extend the system's functionality, using .NET and C#, which was rolled-out to over 600 stores. The system is still in operation in many stores today

- **PnP for CCTV**. Before the advent of IP cameras, I worked with Tesco and JVC to create a Plug and Play (PnP) protocol specification for serial communications (RS-422 / RS-485) for CCTV cameras. The specification included protocols for camera discovery and control (pan / tilt / zoom / focus), and was successfully implemented by JVC (with other manufacturers, such as Pelco, considering its implementation)

1991-2000: Secure Solutions Ltd

I joined Secure Solutions Ltd shortly after graduating from the University of Liverpool.

Roles

- Software Developer

- Systems Architect
- Development Manager

Project Highlights

- **RACE** (Reactive Audit Capture and Evaluation). A retail Loss Prevention & Security system that provided CCTV camera control, Point of Sale (PoS) checkout monitoring, and cash-room monitoring

    - Ran on MS-DOS 5.0

    - Written in C

    - Serial (RS-232 / RS-485) networking

    - Piloted in 3 Tesco stores

    - I helped to develop the system, from scratch, with one other software developer and a hardware engineer. I was also involved with supporting the system (telephone and remote desktop)

- **TIGRIS** (Totally Integrated Graphical Retail Information System). A retail Loss Prevention & Security system

    - Ran on Windows 3.1 - XP

    - Written in C, C++, VB6 and HTML / CSS / JavaScript

    - Serial (RS-232 / RS-485), UDP / TCP/IP and RFID networking

    - Comprised the following configurable modules:

        - **Control**; provided control of CCTV cameras

        - **PoS**; monitored Point of Sale checkouts for possible incidents of employee theft

        - **TrolleyTrak**; tracked the movement of trolleys (via Texas Instruments' TIRIS RFID technology) to detect possible incidents of customer walk-out theft (i.e. leaving a store without paying)

        - **Queue Management**; combined PoS and TrolleyTrak to predict customer queues and alert checkout supervisors (via pagers) in advance

        - **ANPR**; monitored vehicle license plates at petrol filling stations

        - **Incident Database**; provided a customer theft reporting tool

    - TIGRIS TrolleyTrak was piloted in 11 Morrisons stores

    - TIGRIS Queue Management was piloted in 1 Tesco store

    - TIGRIS Control and PoS was piloted in a small number of Asda and Safeway stores

    - TIGRIS Control, PoS, ANPR and Incident Database, was rolled-out into over 300 Tesco stores

    - I helped to architect and develop the system, from scratch, with other software developers and hardware engineers. I was also involved in supporting the system (pager / telephone and remote desktop). I later became responsible for the development team and assumed the role

of Development Manager

- **Hardware**. I was involved in the design, manufacture and system integration of a small number of in-house developed RACE / TIGRIS hardware devices (such as CCTV camera control joysticks and PoS interface units)

Education

1988-1991: University of Liverpool

- BSc (Hons) **2:1** Computer Science

1986-1988: St John Rigby RC 6th Form College, Orrell

- 'A' Level Grade **B** Computer Science
- 'A' Level Grade **C** Art (practical and history)
- 'A' Level Grade **D** Mathematics

1981-1986: St Thomas More RC High School, Wigan

- 7 'O' Levels (Grade **B** Mathematics, Grade **C** English, Grade **C** Computer Science)

Personal

- **Date of Birth**: 8th July 1970

- **Marital Status**: Married

- **Interests**: Technology (AI), current affairs, music (rock), podcasts, films, reading (fiction / non-fiction) and sport (cricket, F1)

- **Achievements**: I taught myself to code at the age of 13 (C64 BASIC, 6502 assembly). Also, I helped to build a house between the ages of 13 and 16

- **Other**: I have a full, clean driving licence. I am in excellent health (I take no medication). Also, I am a non-smoker